UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/024,759	12/19/2001	Johannes Bruijns	NL000731	3989

24737	7590	05/31/2005

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EXAMINER
AZARIAN, SEYED H

ART UNIT	PAPER NUMBER
2625	

DATE MAILED: 05/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
	10/024,759	BRUIJNS, JOHANNES
Office Action Summary	Examiner	Art Unit	
	Seyed Azarian	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>02 March 2005</u>.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-20</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-20</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>19 December 2001</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All b)☐ Some * c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

RESPONSE TO AMENDMENT

1.   Applicant's arguments, filed, 3/2/2005, see page 11 through 17, of remarks with respect

to the rejection of claims 1-20 under 102(e) and 103(a) have been fully considered but they are

not persuasive. However, upon further consideration, a new ground of rejection is made in view

of Prince (U.S.5, 590,654), necessitated by applicant's amendment.

2.   Applicant argues in essence regarding claim 1, that Cheng does not disclosed or suggest

"voxels of at least first type and second type".

        However upon the further reviewing, contrary to the applicants' assertion of limitation in

the amended claim the Examiner disagrees and indicates Cheng teaches: it is **divided into two**

stages (steps) of processing. In the first stage, a membership function for fuzzy reasoning is

determined by **"pre-classified" voxel data (first type)**. In the second stage every voxel is

classified into three types of classes that are "tumor", "normal tissue", and "boundary" (column

6, lines 33-40). Further it mentions the **voxel in the darker area (first type)** has a higher degree

for "tumor". The **voxel in the brighter area (second type)** has a higher degree for "normal

tissue" (column 7, lines 1-10).

        In response to applicant's argument that regarding claim 1, that Cheng does not disclosed

or suggest "the voxel of first type are boundary voxels that adjoin voxels of the second or further

types" classification of each voxel, the boundary is defined as a normal tissue which is adjacent

to the tumor. If a voxel is tumor, it is not adjacent to normal tissue, if a voxel is normal tissue, it

is not adjacent to tumor, if a voxel is boundary, it must be adjacent to both of the tumor and

normal tissue (column 7, lines 56-64).

In response to applicant's argument that regarding claim 1, that Cheng does not disclosed or suggest "classifying voxels based on the assigned data values teach" (column 5, lines 33-46, generates the function for each index such as distance between center of gravity of intensity and morphological center corresponding to histogram of classified voxel data such as tumor or normal tissue or boundary, also column 12, lines 25-33, voxel selecting and value calculating processor voxel which classified as boundary to obtain the average value of intensity and distance);

In response to applicants' argument, regarding claim 2, that Cheng does not disclose the "determination of two different type of boundary voxels" (column 4, lines 53-59, discriminating a degree of surface roughness of a tumor, extracting a boundary between tissues to find breast cancer tissues out of the tissues based on the voxel data, also column 7, lines 56-65, if a voxel is normal tissue, it is not adjacent to tumor, if a voxel is boundary, it must be adjacent to both of the tumor and the normal tissue).

Finally in response to applicants' argument, regarding claim 1, that method in the specification for determining the volume of an "**aneurysm (blood vessel)**, the first step is to classify the voxels as first type vessel voxels". With respect to applicant's argument the Examiner would like to point out that, **aneurysm (blood vessel),** as first type vessel voxels is not recited in independent claim 1, and call in the specification.

Claim Rejections - 35 USC § 102

3.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United
> States before the invention thereof by the applicant for patent, or on an international application by another who
> has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention
> thereof by the applicant for patent.

4.   Claims 1-5, 7 and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by Cheng

et al (U.S. patent 6,309,353).

Regarding claim 1, Cheng discloses a method for analyzing a data set of an object to be

examined, which data set comprises voxels of at least a first type and a second type said method

comprising the steps (see abstract, also column 6, lines 1-9, both types of tumors can be well

extracted, by evaluating the surface of the tumors);

a) classifying the voxels as voxels of the first, the second or further types; thereafter

(column 4, lines 32-37, classifying voxel data of the tumor as "tumor", "normal tissue" or

"boundary");

b) determining which of the voxels of the first type are boundary voxels that adjoin voxels

of the second or further types; thereafter (column 5, lines 34-47, classified voxel data such as

tumor, normal tissue or boundary using the output from the LOG filter, also column 7, lines 56-

64 classification of each voxel, the boundary is defined as a normal tissue which is adjacent to

the tumor. If a voxel is tumor, it is not adjacent to normal tissue, if a voxel is normal tissue, it is

not adjacent to tumor, if a voxel is boundary, it must be adjacent to both of the tumor and normal

tissue);

c) assigning a data value to each voxel of the first type, said data value representing a

measure of the distance between said voxel and the nearest boundary voxel; thereafter (column

5, lines 33-46, generates the function for each index such as distance between center of gravity of

intensity and morphological center corresponding to histogram of classified voxel data such as

tumor or normal tissue or boundary, also column 12, lines 25-33, voxel selecting and value

calculating processor voxel which classified as boundary to obtain the average value of intensity

and distance);

d) classifying the voxels of the first type that have a distance data value exceeding a

predetermined threshold as aberration voxels indicative of an aberration in the object (column

16, lines 11-18, for judging the tumor as malignant tumor (aberration), when r (calculating

parameter) is larger than the threshold, tumor is judged as "malignant" (aberration voxels), if r is

smaller than the threshold, the tumor is judged as benign).

Regarding claim 2, Cheng discloses the method as defined by claim 1, further comprising

the steps, e) determining which of the aberration voxels are boundary aberration voxels adjoining

non-aberration voxels of the first type (column 4, lines 53-59, discriminating a degree of surface

roughness of a tumor (aberration voxel), extracting a boundary between tissues to find breast

cancer tissues out of the tissues based on the voxel data, also column 7, lines 56-65, if a voxel is

normal tissue (non-aberration), it is not adjacent to tumor, if a voxel is boundary, it must be

adjacent to both of the tumor and the normal tissue);

f) adding a number of voxels of the first type that form a shell of a certain thickness to the

aberration voxels (column 11, lines 55-67 refer to thickness).

Regarding claim 3, Cheng discloses the method as defined by claim 2, wherein the step f

of adding a number of voxel of the first type that from a shell of a certain thickness to the

aberration voxel comprises the steps of, f1 (column 11, lines 43-67, N-1 (N = natural number)

the (I,J,K =0,1,2,) the f(I,J,K) represent a value of intensity), assigning a data value to each voxel

of the first type, said data value representing a measure of the distance between said voxel and

the nearest boundary aberration voxel (column 5, lines 33-46, generates the function for each

index such as distance between center of gravity of intensity and morphological center

corresponding to histogram of classified voxel data such as tumor or normal tissue or boundary

and column 12, lines 25-33, voxel selecting and value calculating processor voxel which

classified as boundary to obtain the average value of intensity and distance);

f2. classifying the voxels of the first type that have a distance data value less than or equal

to a predetermined ceiling value as aberration voxels (column 16, lines 11-18, for judging the

tumor as malignant tumor, when r (calculating parameter) is larger than the threshold, tumor is

judged as malignant (aberration voxels), or r is smaller than the threshold, the tumor is judged as

benign).

Regarding claim 4, Cheng discloses the method as defined by claim 1, further comprising

the steps of, determining the sum of all aberration voxels and multiplying the sum of the

aberration voxels by the volume of a single voxel so as to determine the volume of the aberration

(column 7, lines 2-15, the voxel in the darker area has a higher degree for tumor, all the

parameter is computed in a volume of 7x7 voxel and column 14, lines 13-23, boundary, and

having label number calculating process, the number of voxel in the 3x3 voxel volume).

Regarding claim 5, Cheng discloses the method as defined by claim 1, wherein said distance data values are computed by means of a distance transform function (column 12, lines 25-34).

Regarding claim 6, Cheng discloses the method as defined by claim 1, wherein said predetermined threshold and/or ceiling value is set by a user (column 15, lines 26-35, to set parameter (r) =1 (threshold, also column 16, lines 4-18, predetermined threshold).

Regarding claim 7, Cheng discloses a method as defined by claim 1, wherein said predetermined threshold is computed on the basis of a histogram of distance data values (see claim 6, also column 5, lines 37-47, classified voxel data such as tumor or normal tissue, based on histogram).

Regarding claim 10, Cheng discloses a computer program for carrying out the method as claimed in claim 1 (column 9, lines 12-21, DEC Pentium, and program for carrying out the 3D-image).

Regarding claim 11-14, it recites similar limitation as claims 6 and 7 are similarly analyzed.

Claim Rejections - 35 U.S.C. ә 103

5.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in

section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the

manner in which the invention was made.

6.   Claims 8 and 9, are rejected under 35 U.S.C. 103(a) as being unpatentable over Cheng et

al (U.S. patent 6,309,353) in view of Aylward et al (U.S. patent 6,690,816).

Regarding claims 8 and 9, Cheng fails to disclose "the potential tubular structure voxel".

On the other hand in the same field of medical system, Aylward, teaches image elements of

tubular objects between a source image and a destination image and registration of tubular

objects (Fig. 18, column 24, lines 27-53).

Therefore it would have been obvious to a person of ordinary skill in the art at time the

invention was made, to modify Cheng invention according to the teachings of Aylward because

it provides plurality of cross-sections along the tubular object for establishing a seed point

corresponding to a tubular object, which can easily be implemented in an X-ray device such as

angiography.

7.   Claims 15-20, are rejected under 35 U.S.C. 103(a) as being unpatentable over Cheng et al

(U.S. patent 6,309,353) in view of Aylward et al (U.S. patent 6,690,816) as applied to claims

above and further in view of Prince (U.S.5,590,654).

However regarding claim 15, neither Cheng nor Aylward explicitly state, "object is a

blood vessel and the aberration is an aneurysm". On the other hand Prince, in the same field of

X-ray system teaches an imaging technique using one or several of the sequences may provide

limited information of the distal end of the aneurysm (dynamic gadolinium enhanced 3D volume

imaging sequence) for patient evaluation (column 10, lines 14-39).

Therefore it would have been obvious to a person of ordinary skill in the art at time the

invention was made, to modify Cheng and Aylward invention according to the teachings of

Prince because its provides detecting, diagnosing, and treating arterial diseases or aneurismal

disease, which can easily be implemented in an image device such as X-ray system.

Regarding claim 20, Cheng discloses a method as defined by claim 16, wherein the voxel

are classified by means of a region-growing algorithm (Fig.15, column 14-20, show breast tumor

extraction algorithm).

Regarding claim 16, it recites similar limitation as claims 1 and 15 are similarly analyzed.

Regarding claims 17-19, it recites similar limitation as claims 2, 3 and 4 are similarly

analyzed.

Conclusion

8.   Applicant's amendment necessitated the new ground(s) of rejection presented in this

Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this

final action.
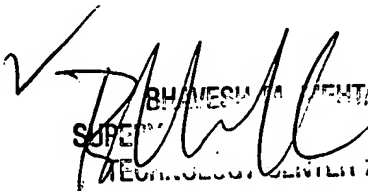

Contact Information

9.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Seyed Azarian whose telephone number is (571) 272-7443. The

examiner can normally be reached on Monday through Thursday from 6:00 a.m. to 7:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Bhavesh Mehta, can be reached at (571) 272-7453. The fax phone number for the

organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent

Application information Retrieval (PAIR) system. Status information for published application

may be obtained from either Private PAIR or Public PAIR.

Status information about the PAIR system, see http:// pair-direct.uspto.gov. Should you have

questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at

866-217-9197 (toll-free).

Seyed Azarian
Patent Examiner
Group Art Unit 2625
May 19, 2005

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